

# DEVELOPMENT OF AN INTERVENTION MODULE TO IMPROVE THE PERCEPTUAL ACCURACY OF ATHLETES WITH INTELLECTUAL DEVELOPMENTAL DISABILITIES

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DOI: [10.5281/zenodo.10077966](https://doi.org/10.5281/zenodo.10077966)

## Abstract

Accurate perception is a very important skill in any sport, as it reduces errors in performance and enhances performance. Individuals can have accurate perceptions only after paying proper attention to the stimulus for some period. Thus, making sustained attention another important skill required in sports. Research shows that individuals with Intellectual Developmental Disabilities have impairment in both perceptual accuracy and sustained attention. Therefore, the present study aims to develop an intervention that can improve sustained attention thus in turn enhancing the perceptual accuracy of athletes with Intellectual Developmental Disabilities. In the present study, 10 individuals with mild intellectual deficits were selected as a sample. Participants' perceptual accuracy was measured in pre and post-test situations using the Benton Visual Retention Test (BVRT) and intervention was provided in between the test sessions. Two activities were used as intervention- Boundary and tear paste activities. The duration of the intervention was 4 weeks (total of 8 sessions). The result revealed that there was an increase in the mean score in the post-test condition but the difference between pre and post-test mean was not statistically significant. However, an analysis of pictures drawn by the participants in both conditions as well as session-wise analysis revealed some improvement in both sustained attention and perceptual accuracy. Therefore, the study concludes that long-term interventions can improve the perceptual accuracy of athletes with Intellectual Developmental Disabilities.

**Keywords:** Intellectual Developmental Disability, Athletes, Perceptual accuracy, Sustained attention, Intervention.

## INTRODUCTION

Performance in sports requires different cognitive abilities. Perceptual accuracy is one of them and it involves the accurate perception of the target stimulus. Athletes need to perceive the target stimulus precisely and they need to ignore unnecessary information. For instance, in table tennis, the athlete needs to focus on the movement of the ball while ignoring other stimuli in the environment. Similarly, in football players need to focus on the ball and the movement of other players. Perceptual accuracy helps athletes to be ready mentally during sports. This mental readiness improves their performance (1). For instance, if a footballer is mentally prepared during the match, He can make accurate passes, perceive the movement of the ball and other players, and make fewer errors. This level of perceptual accuracy requires them to hold their attention to the target stimulus for a long period. Therefore, sustained attention is another important skill required for successful performance. Several research has supported this view (2-3). Research has also shown that skilled athletes are better able to hold their attention compared to novices (4).

According to the Diagnostic and Statistical Manual of Mental Disorder, Intellectual Developmental Disability is a type of neurodevelopmental disability that involves a deficit in cognitive and adaptive functioning (5). Participation in various sporting activities can be an important rehabilitation process for individuals with intellectual

disabilities. According to the report of Special Olympics Bharat 14,21,126 (above 8 years) athletes with Intellectual Developmental disabilities are involved in various sports in India (6).

Individuals with intellectual impairment have deficits in attention (7) and so is supported by a systematic review of Scopus, PsycINFO, and PubMed databases (8). This attention deficit may lead to inaccurate perceptions. Several researchers have supported this for instance, in a study researchers found that in visual search tasks, individuals with intellectual impairment required more time to complete the task compared to their normal counterparts (9) Similarly, in another study, 16 boys and 7 boys with intellectual deficit and Attention Deficit Hyperactive disorder to 11 boys and 9 girls with intellectual deficit but without attention deficit hyperactive disorder. The result revealed that individuals with intellectual deficits have impairment in vigilance tasks (10).

The above discussion revealed that Cognitive intervention is required to improve sustained attention of individuals with intellectual disabilities which in turn may enhance their perceptual accuracy. In cognitive intervention, individuals must practice a task several times. Practice strengthens the neural connectivity related to the domain. For instance, repeated practice of sorting tasks may improve the sustained attention of the individual. The intervention is also based on the concept of plasticity- the ability of the brain to change due to practice and training. Even though individuals with intellectual disabilities have some cognitive limitations, a well-planned cognitive intervention can improve their cognitive skills (11).

Most of the cognitive interventions have targeted working memory (12-14) and executive functioning (15-16). There are comparatively fewer interventions focusing on sustained attention and perceptual accuracy, especially for athletes with intellectual disabilities.

Therefore, the objective of the study is to develop an intervention module to improve the perceptual accuracy of athletes with Intellectual Developmental Disabilities.

## **METHOD**

### **Sample**

10 individuals (6 male and 4 female) with Intellectual Developmental Disabilities (IQ 50-70) and involved in sports.

Inclusion criteria:

1. Male and female participants with Intellectual Developmental Disability
2. IQ between 50 to 70
3. All of them are verbal
4. All of them are involved in sports.

Exclusion Criteria:

1. Presence of any visual impairment
2. Presence of any auditory impairment
3. Any other disability or disease as clinically determined

## Materials

Binet Kamat test of Intelligence (BKT) (17).

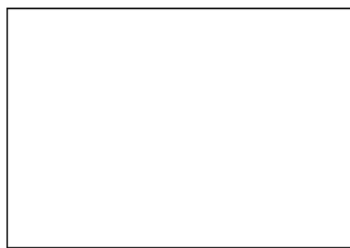
Benton Visual Retention Test (BVRT) (18)

## Procedure:

- 1) Participants were screened based on their IQ. Individuals with mild Intellectual Developmental Disabilities (IQ 50-70) were selected for the present study. Before data collection informed consent was obtained from the parents.
- 2) In the pre-test condition the perceptual accuracy was assessed
- 3) Next intervention was provided to improve the sustained attention of the participants. During the intervention phase following two activities were used

## Boundaries

In this activity, participants were required to color a specific shape without moving beyond the boundaries of the shape. The complexity of the task was increased as the participants successfully completed the previous level. The activity comprised of 3 different levels of complexity, i.e., low, moderate, and high. The variation in the complexity was concerning changes in the size of the given image.



Low complexity



Moderate Complexity



High Complexity

The purpose of the activity was to enhance the sustained attention of the participants. Further, this activity helped to build patience and control as well.

## ***Tear and Paste activity***

In this activity, participants were required to tear colourful paper and paste the pieces inside a given shape. The complexity of the task was also increased. The purpose of this task was to enhance sustained attention and concentration.

In both boundary and tear paste activity, A shift from one level of complexity to another was determined based on the following criteria:

- A success rate of 50%, i.e., half of the task is completed working within the limits of the given shape.
- Time taken in completing the activity, for example, a drop-in time required to complete the task in the first two sessions will lead to a shift to increased complexity in the third session.

A total of 8 intervention sessions were conducted with each participant and the sessions were 40 mins. Intervention was always provided on a one-on-one basis.

4. After intervention post-test was obtained by assessing the perceptual accuracy of the participants.

### Data Analysis

Data was analyzed statistically using the Statistical Package for Social Sciences (SPSS). Descriptive statistics was used to assess the mean and standard deviation, whereas Kolmogorov-Smirnov and Leven's test was used to assess the normality and homogeneity of the variances. Paired t-test was used as the data satisfy both the assumptions of normality and homogeneity.

## RESULTS

Table 1 reflects that in the post-test situation mean is high in comparison to the pre-test condition. However, paired t-test revealed no significant difference between the means.

**Table 1: Score of BVRT before and after intervention**

	Mean	SD	t	p-value
Pre-test	2.5	0.97	-1.96	0.081
Post-test	2.8	1.0		

## DISCUSSION

Accuracy in perception is required in any kind of sports as it improves the performance of the athletes. Sustained attention is closely associated with perceptual accuracy. To perceive accurately one needs to pay and hold his/her attention to the stimulus for some period. Therefore, the present study aims to develop an intervention program that can improve sustained attention among athletes with intellectual developmental disabilities, and this will further improve the perceptual accuracy among the participants. Benton Visual Retention Test (BVRT) was used to assess the perceptual accuracy of the participants before and after the intervention. Participants during BVRT had to draw ten figures from ten cards. The picture produced by the participants reflected their perceptual accuracy. Accurate production of the pictures in the BVRT test required the participants to concentrate on the stimulus pictures. In other words, sustained attention was required for the accurate replication of the pictures on the card.

In the pre-test condition, it was observed that participants had difficulty reproducing pictures of the BVRT. These may be due to the difficulty in their attention. However, there were some improvements in the post-test situation. Quantitative analysis revealed the in-post-test situation the score was more compared to the pre-test condition. However, the differences between the scores were not statistically significant.

Analysis of the picture revealed some improvement in the post-test situation. For instance, there were improvements in the figure drawn by the participants. In the picture, they had drawn circles, boxes, and curves in the right direction, and in some pictures, they even drew figures that they omitted in the pre-test condition. These observations revealed that even though the scores of the pre and post-test conditions were not significantly different from each other. Still, the intervention improved the perceptual accuracy of the participants to some extent.

Further, the analysis of the intervention sessions also revealed gradual improvement from the first session to the final session. In the present study, two activities were used for intervention. The first intervention was 'boundary'. In this task, the participants were instructed to fill a shape with colour without crossing the boundary of the shape. Individuals who have deficits in attention usually have difficulty in filling the shape without crossing the boundary or in other words, restricting themselves within a boundary. In the present study, the participants faced difficulty in filling the shape and restricting themselves in the initial sessions. However, as the instruction progressed, the performance of the participants improved in the task. They completed the low and moderate complexity levels of tasks with almost no errors. However, in the case of the most difficult one they still made some errors. Although, the amount of error was much less in comparison to the initial sessions. Further, in the initial sessions, participants were very distracted and required a lot of prompts to complete the tasks. But as the sessions progressed, gradually they became less distracted, and the number of prompts also reduced. All these observations indicated that the task 'boundary' was effective in improving the sustained attention of the participants.

The second task that was used in the present study was tear and paste activity. In this task, the participants tore colorful pages into pieces and pasted them in a particular shape. Here also, the complexity of the shape was increased as the intervention sessions progressed. In this activity also, participants were distracted in the initial sessions and required constant prompts. But as the sessions progressed the participants started to show improvement in their level of attention as well as the number of prompts also decreased. In the initial sessions, participants had difficulty tearing the pages into small pieces. They required constant assistance in tearing the pieces. However, with progressions in the sessions, they were able to tear the pages into small pieces and paste them within the shape. Tearing pages into small pieces requires attention and concentration. Therefore, findings revealed that the second task 'tear and paste' activity was also effective in the attention of the participants. Therefore, this study shows that through well-planned intervention it is possible to improve sustained attention as well as perceptual accuracy of the athletes with Intellectual Developmental Disability.

## CONCLUSION

This study concludes that proper cognitive intervention can improve sustained attention and perceptual accuracy of athletes with Intellectual Developmental Disabilities. However, long-term intervention is required to have a more prominent effect on sustained attention and perceptual accuracy.

**Ethical Guidelines:** The research followed all ethical guidelines. Informed consent was taken from parents and teachers.

**Conflict of Interest:** The Author declared no conflict of interest.

**Funding:** The study is funded by Manav Rachna International Institute of Research and Studies, Faridabad, India

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